A phased closure of the Cinder Lake Landfill will begin upon completion of Area A, and will continue in stages as additional areas of the landfill are completed. Closure of Area A is not anticipated for over five years, and final closure of the landfill is not anticipated for over forty years. It is likely that numerous factors may change during this time. As a result, this closure plan should be considered as a preliminary plan. It will be periodically reviewed and updated throughout the operational life of the facility. One year prior to the expected closure of Area A, a formal review of the closure plan will be conducted and a final closure plan will be prepared that includes an updated site map and site conditions; and confirmation and/or changes to the final cover design. Prior to closure of each area, a review of the closure plan will be conducted and adjusted as needed.

11.1 **CLOSURE NOTIFICATION**

11.1.1 Agency Notification

At least 90 days prior to closure, a written notice of intent to close will be submitted to the ADEQ. The notice will include the anticipated closure date and a copy of the final closure plan.

11.1.2 Public Notification

Six months prior to the anticipated final closure of the landfill, the City will begin public notifications specifying the anticipated closure date and identifying the location of the new MSW disposal site. Public service announcements will be prepared and distributed to the local media. Notification procedures may also include placing display ads in local newspapers, distributing fliers through the local school and using inserts in utility and/or tax bills. Signs will be posted at the entrance to the site at least 60 days prior to closure. The sign will include the intended date of closure of the site and will provide the location of alternative permitted solid waste management facilities.

11.2 **CLOSURE SCHEDULE**

Closure activities will begin no later than 30 days after the last load of MSW is disposed in the landfill. Closure will be completed within 180 days following the beginning of closure activities. A flow chart depicting the steps required for closure is included as Figure 11-1. A detailed schedule for completion of all closure activities will be presented in the final closure plan.

CLOSURE PLAN 11.3

The landfill closure plan focuses on the need to establish low-maintenance cover systems and the need to design a final cover that minimizes the infiltration of precipitation into the waste.

11.3.1 Final Cover

The final cover system detailed plans are presented in Drawings 4 and 10. The final cover for the lined lateral expansion areas will include (from the top, down):

- An erosion layer consisting of 6 inches of topsoil (or cinders)
- A 12-inch layer of random fill (or cinders)
- A 6-inch sand (or cinders) drain layer
- A 60-mil HDPE or other appropriate flexible membrane liner (FML)
- A GCL (or soil-bentonite layer)
- A minimum of a 18-inch buffer layer

Alternatively the monolithic fill cap as described in Section 8.12 may be utilized if approved by ADEQ.

The final cover configuration for the existing landfill footprint will have a permeability of no greater than 1×10^{-5} cm/sec and include:

- An erosion layer consisting of 6 inches of topsoil or cinders
- A 12-inch layer of random fill
- A 6-inch sand drain layer, draining to a storm water collection system
- A 60-mil HDPE or other appropriate flexible membrane liner (FML)
- A minimum of a 18-inch buffer layer

The top of the final cover will be installed and maintained with a 3 to 5 percent slope. The side slope will have a maximum grade of 3:1 and will intersect with a stormwater collection system around the perimeter of the site. This collection system will consist of a grass lined erosion control ditch. The conceptual CQA plan presented in Appendix H will also be utilized for closure-related construction.

11.3.2 Site Security

Upon final closure of the landfill, the landfill gate will be chained and locked. The posted signs identifying the location of the alternative MSW facility will remain for a period of not less than 180 days after the landfill has received the final shipment of waste.

An additional sign will be posted in a visible location indicating a telephone number for emergency notification. This sign will remain for the duration of the post-closure maintenance period.

11.3.3 Decontamination and Removal of Structures

Upon closure of the site, the scale house, offices, emergency generator, earthwork equipment and aboveground tanks (diesel and propane) will be cleaned and/or decontaminated as necessary and removed from the site. Demolition debris and components of environmental control systems, which are dismantled at the time of closure or post-closure, will be disposed in the landfill or transported and disposed of at another solid waste facility. Any remaining MSW at the facility will be placed in the landfill prior to construction of the final cover.

11.3.4 Storm Water Management System

Final site configuration will be designed so that surface water runoff is directed away from the landfill, to infiltration areas as described in Section 8.2. Since the area surrounding the landfill is

generally flat and the surface soils are very permeable, run-on is not expected. The operational provisions for erosion control and slope protection from rain, wind, and frost presented in Section 8.0 will be continued during site closure and post-closure maintenance.

11.3.5 Closure Costs

Estimated closure costs and a demonstration of financial capability for the City of Flagstaff are presented in Appendix A.

11.4 **CLOSURE CERTIFICATION**

After verification has been conducted that all closure activities are complete, a certification will be prepared and submitted to the ADEQ for approval. The approved certification will be place in the Landfill operating record. Additionally, the required land deed notification will be implemented. A copy will be included in the operating record and sent to the ADEQ.

11.5 POST-CLOSURE PLAN

Post-closure care will continue for 30 years after the closure of the landfill. Records will be kept detailing changes in post-closure care personnel to ensure that changing personnel will not affect post-closure care due to lack of knowledge of routine activities. Changes in personnel will also be included in the operating record.

11.5.1 Inspections

At least once a week during the first year after final closure of the landfill, staff from the City of Flagstaff will visit the site for the purpose of removing any MSW that is illicitly left by the landfill gate. The MSW will be investigated in an attempt to identify the party that left the MSW at the gate. If the party is identified, the MSW will be returned to that party. If the generator of the MSW is not identified, the MSW may be placed in the landfill until construction of the final cover begins. Once the final cover is under construction the illicit MSW will be transported to an alternate MSW facility. After the first year, the frequency of illicit dumping at the gate will be reviewed to determine if the inspection frequency can be reduced. Inspections will occur at a minimum frequency of semiannually during the 30 year post-closure care period. Information from the inspection will be noted on the Record of Inspections (Table 11-1) or an equivalent form.

Inspection of the cover system will be performed on the ground and/or through aerial photography. The inspector will take notice of eroded banks, patches of dead vegetation, animal burrows, subsidence, and cracks along the cover. The inspector will also note the condition of concrete structures such as manholes, leachate collection and removal pipes, gas monitoring systems, and monitoring wells.

The drainage control structures will be monitored closely to assure they perform properly. The system will be monitored on a seasonal basis and following any large storm events. Observations will be made of areas where soil settlement has occurred. Soil settlement will damage the performance of the channels by creating cracks which cause water loss from the channel, or by changing the channel slope which may reduce the channel capacity and consequently cause water loss from the channel. The buildup of debris after each major storm event may also reduce the channel capacity. The cracks and any other damages to the channel will be repaired as soon as Observations will be documented with accompanying site photographs. documentation will be placed in the operating record.

11.5.2 Vadose Zone and Landfill Gas Monitoring

The vadose zone and landfill gas monitoring program discussed in Sections 10 and 7, respectively, will continue during the closure and post-closure period. It should be noted if leachate and/or gas migration is not detected for two consecutive years during the post-closure period, the monitoring frequency may be reduced with ADEQ's approval.

11.5.3 Maintenance

11.5.3.1 Maintenance of Final Cover

The channels will be maintained by cleaning the debris from the channel and maintaining slopes after major storm events. Cracks exceeding 3 inches in depth and any other damages to the channel will be repaired as soon as possible.

11.5.3.2 Maintenance of LCRS and LFG Systems

Routine maintenance activities will be conducted to ensure the LCRS LFG collection, storage, and disposal systems and LFG gas monitoring system are functioning properly. Such activities will be conducted on a weekly basis and may include flushing and pressure cleaning the LCRS to reduce the accumulation of sediment and to prevent biological fouling. Similarly, LFG collection trenches, laterals, headers, condensate traps, exhausters, and flares will be checked for proper operation. All mechanical equipment will be per manufacturer's recommendations. The vents on the gas collection system will be checked to ensure they are not clogged by rocks or other foreign matter. In addition, the leachate collection tanks will be inspected annually for signs of stress including weak points and leaks.

Over time, leachate generation volumes may become low enough so that leachate is no longer collected by the leachate collection system. The City will request ADEQ's approval to cease managing leachate if the City can demonstrate that the leachate no longer poses a threat to human health or the environment.

As previously indicated, if landfill gas is not detected at levels that appear to pose a threat to human health or the environment, the monitoring frequency may be reduced. If however, during the post-closure monitoring period the explosive gas levels exceed the LEL at the property boundary, the monitoring frequencies may increase and the contingency actions described in Section 7 will be taken.

11.5.4 Planned Land Uses

The planned post-closure land use for the landfill is open space. Therefore, it is not anticipated that the post-closure use of the site will disturb the integrity of the final cover or liner system. Care will be taken during the post-closure period to blend the site in with the natural surroundings by covering the surface of the landfill with cinders. A discussion of the landscape plan is presented in Section 8.5.

RESPONSIBLE PARTIES 11.6

The emergency contacts identified in Section 7.2 are presently responsible for all activities at the landfill. The name, address, and telephone number (and probably e-mail address) of individuals responsible for post-closure activities will be provided in the final closure plan.

11.7 **POST-CLOSURE CERTIFICATE**

Following completion of the post-closure care period, the ADEQ will be notified that a certification verifying that post-closure care has been completed in accordance with the post-closure plan has been placed in the operating record.

Table 11-1 RECORD OF INSPECTIONS POST-CLOSURE MAINTENANCE

		Observation of Conditions			
Inspector	Date of Inspection	Leachate Collection and Removal System	Final Cover	Vadose Zone Monitoring	Gas Monitoring

Figure 11-1 FLOW CHART CLOSURE

